Y/TS-362

Y-12

OAK RIDGE Y-12 PLANT

MARTIN MARIETTA

ENVIRONMENTAL ASSESSMENT PLAN FOR THE DIESEL FUEL RELEASE AT THE UNDERGROUND STORAGE TANK AT BUILDING 9754-1 OAK RIDGE Y-12 PLANT

D. E. Bohrman
C. S. Haase
Mickey Willoughby

December 1987

ANAGED BY
ARTIN MARIETTA ENERGY SYSTEMS, INC.
OR THE UNITED STATES
EPARTMENT OF ENERGY

~~Y-12 Central Files~~ (RC)

Distribution

Recipients
J. M. Mills, Jr.
Y-12 Central Files (RC)

Issue Date: December 11, 1987

Y/TS-362

ENVIRONMENTAL ASSESSMENT PLAN FOR THE DIESEL FUEL RELEASE AT THE UNDERGROUND STORAGE TANK AT BUILDING 9754-1 OAK RIDGE Y-12 PLANT

D. E. Bohrman
C. S. Haase[1]
Mickey Willoughby

Environmental Management Department

Health, Safety, Environment,
and Accountability Division

[1]Environmental Sciences Division, Oak Ridge National Laboratory

Prepared by the
Oak Ridge Y-12 Plant
Oak Ridge, Tennessee 37831
operated by
MARTIN MARIETTA ENERGY SYSTEMS, INC.
for the
U.S. DEPARTMENT OF ENERGY
under contract DE-AC05-840R21400

ENVIRONMENTAL ASSESSMENT PLAN FOR THE DIESEL FUEL RELEASE AT THE UNDERGROUND STORAGE TANK AT BUILDING 9754-1 OAK RIDGE Y-12 PLANT

1.0 INTRODUCTION

On September 15, 1987, a Petro-Tite leak test was attempted on an underground diesel fuel storage tank adjacent to Building 9754-1 in the Y-12 Plant. During the test, approximately 85 gallons* of diesel fuel were released into the gravel/soil backfill adjacent to the tank. On October 16, 1987, the Tennessee Department of Health and Environment (TDHE) was notified of the release by the U.S. Department of Energy (DOE). TDHE has required that an environmental assessment plan be prepared to address the release (Reference 1).

The purpose of this environmental assessment plan is to describe the release and to present a plan for investigating the site to determine the extent of diesel fuel contamination in the soil, groundwater, and local surface water as a result of the diesel fuel release.

2.0 DESCRIPTION AND HISTORY OF SITE

The Rust Engineering Company, a prime contractor to the DOE, operates a facility (Building 9754-1) for storage and transfer of gasoline and diesel fuel. The facility is located north of Building 9831 at the west end of the Oak Ridge Y-12 Plant (Figure 1). The facility consists of three underground storage tanks, transfer piping, a fuel loading station, and a gasoline dispensing pump. The facility is shown on the attached Drawing C2E-141584.

---

*Initial reports indicated that approximately 100 gallons of diesel fuel were released to the environment. Subsequent investigation indicates that the release quantity was approximately 85 gallons.

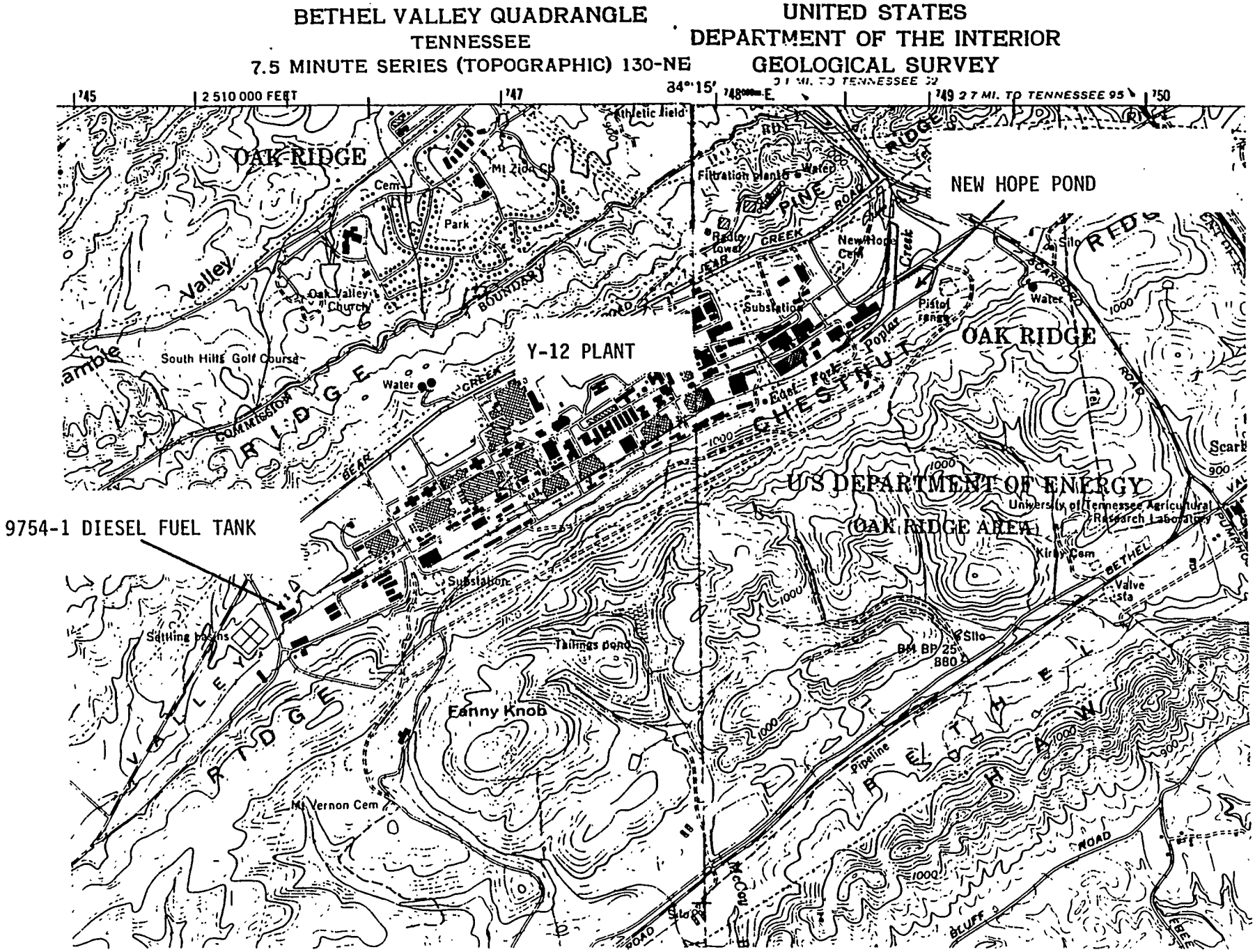


FIGURE 1. Location of 9754-1 Diesel Fuel Tank in the Y-12 Plant.

The west tank, from which the release occurred, is used for storage of diesel fuel and has a capacity of 12,000 gallons and a diameter of 10 feet 4 inches. The middle and east tanks are used for storage of gasoline and have capacities of 12,000 and 8,000 gallons, respectively. The tanks and associated piping are reported to be constructed of steel. Crushed stone was used as bedding material for the tanks and as backfill material for the excavation around the tanks. A concrete pad exists over the top of the tanks for the driveway surface. The bottom of the tanks are about 13 feet below ground surface.

The 12,000 gallon diesel fuel tank is between 20 and 40 years old. The 12,000 gallon gasoline tank is approximately 20 years old. The 8,000 gallon gasoline tank is approximately 8 years old and had sacrificial anodes when it was installed. No information is available to support the existence of any cathodic protection for the diesel fuel tank or the 12,000 gallon gasoline tank.

Approximately six years ago, problems were encountered with groundwater rising to the neck of the fill spouts of the tanks, entering the fill spouts, and contaminating the gasoline and diesel fuel. A french drain was installed on the south side of the tanks to lower the groundwater level and prevent groundwater intrusion into the tanks. The drain was constructed of crushed stone and 4 or 6 inch perforated PVC pipe. The pipe was laid 3 to 5 feet deep and discharges into a storm sewer catch basin immediately west of the tanks.

The fuel loading station is identified as Building 9754-1; therefore, the diesel fuel tank at which the release occurred will be called the 9754-1 diesel fuel tank.

It should be noted that as-built drawings of this facility presenting the underground tank sizes, materials of construction, etc. are not available. The information presented herein is based on a single design drawing and discussions with personnel familiar with the history of the site.

The 9754-1 diesel fuel tank is within the perimeter fence of the Oak Ridge Y-12 Plant and is within an area that has historically been limited access. There are no known water supply wells within the plant or its vicinity.

3.0 DIESEL FUEL RELEASE

3.1 Description of Release

On September 15, 1987, a Petro-Tite leak test was initiated on the 9754-1 diesel fuel tank (Reference 2). The test was initiated by completely filling the tank with diesel fuel, inserting a liquid level tube gage into the fill nozzle of the tank, and filling the liquid level tube to a prescribed height with diesel fuel to establish a positive pressure of 5 pounds per square inch in the tank. Normal completion of the test would consist of monitoring and maintaining the diesel fuel level in the gage, monitoring the temperature of the diesel fuel, and recording the elapsed time to determine if any leakage occurred and, if so, the leakage rate. During the testing of the 9754-1 diesel fuel tank, the diesel fuel level in the liquid level tube gage could not be maintained. Approximately 85 gallons of diesel fuel were added to the tank fill nozzle in an effort to stabilize the liquid level and allow completion of the test. A high diesel fuel loss rate prevented the completion of the test. It is assumed that the 85 gallons of diesel fuel initially leaked into the gravel and soil backfill adjacent to the tank.

The diesel fuel released from the tank was a product material originally intended as an energy source for trucks, construction equipment, and vehicles. The diesel fuel was not a waste material and should have not contained uranium.

On September 15, 1987, after the termination of the leak test, and on September 16, 1987, a visible oil sheen was observed in the storm sewer catch basin west of the diesel fuel tank where the french drain discharges. In addition, an odor of diesel fuel emanated from the

catch basin. Diesel fuel was not observed seeping from the ground surface in the immediate area. On September 15, 1987, after the termination of the test, approximately 1200 - 1400 gallons of diesel fuel were transferred from the 9754-1 diesel fuel tank to a transport truck. The visible oil sheen and diesel fuel odor was not present in the catch basin on September 17, 1987.

It is suspected that the leak occurred in the upper portion of the tank or associated piping. The exact source of the leak is unknown. Containment or cleanup of the released diesel fuel has not been performed.

3.2 Actions Taken to Prevent Future Release

During the period of October 21 to October 28, 1987, the Y-12 Equipment, Testing and Inspection Department made several measurements of the liquid level and liquid temperature of the 9754-1 diesel fuel tank and obtained the inventory input and output information. They evaluated the data and concluded that the tank did not leak if the diesel fuel depth is below 68 inches. (The tank has a diameter of 124 inches.) Apparently, the leak is in the top of the tank or in the piping above the tank. The 9754-1 diesel fuel tank is currently being used for storage of diesel fuel with the restriction that depth of diesel fuel not exceed 60 inches.

The following activities have been or will be implemented to minimize the possibility and extent of future releases that may occur:

1. Administrative controls have been placed on the tank to prohibit filling of the tank to liquid depths greater than 60 inches.

2. On a weekly basis, the Y-12 Equipment, Testing and Inspection Department will conduct measurements of the liquid level and temperature and obtain inventory input and output information to verify that the tank has not started leaking. Evidence of any leakage will be reported to the Y-12 Environmental Management

Department and the Plant Shift Superintendent's Office. Tank leakage will result in immediate appropriate action to stop any product release.

3. On each regular work day, the Y-12 Environmental Monitoring Group will inspect the catch basin west of the 9754-1 tank site for visible oil sheens and/or diesel fuel/gasoline odors. The presence of sheens or odors will be investigated and, if necessary, appropriate spill response and corrective actions will be initiated.

4. A request will be made to the Rust Engineering Company to instruct personnel who regularly work in the 9754-1 area to immediately report the following to the Plant Shift Superintendent's Office so that prompt response can be initiated:

   - visible oil sheens on the water in the storm sewer catch basin west of the tanks,

   - diesel fuel or gasoline odors emanating from the storm sewer catch basin, and

   - gasoline and diesel fuel spills that enter the catch basin.

3.3 Available Information on Release to the Environment

Based upon conversations with personnel who attempted the Petro-Tite leak test and with personnel who work in the 9754-1 area, and based upon preliminary observations of the site, the following observations are made:

- at least 85 gallons of diesel fuel were released into the soil/gravel adjacent to the 9754-1 diesel fuel tank, and

- an unknown portion of the released diesel fuel entered the

storm sewer catch basin west of the 9754-1 diesel fuel tank through the french drain system.

4.0 HEALTH, SAFETY AND FIRE PROTECTION

Appropriate health, safety, and fire protection measures will be implemented during the performance of all work described in this plan. If necessary, minor changes may be made to the work described herein to ensure that dangerous situations are avoided (i.e. - movement of a borehole or groundwater well to avoid drilling through a gasoline or diesel fuel line).

5.0 SITE HYDROLOGY AND GEOLOGY

5.1 Surface Water

Surface water runoff from the site drains into a catch basin that connects to a storm sewer system which discharges into the East Fork Poplar Creek (EFPC). East Fork Poplar Creek flows through an oil skimmer prior to emptying into New Hope Pond (NHP) (Figure 1), which has a National Pollutant Discharge Elimination System (NPDES) permit discharge point at its effluent.

A review of the plant's spill records indicates that there were no reports of oil sheens or films on EFPC or NHP during the period of September 15 to November 16, 1987. If any unobserved oil sheens occurred on EFPC, the oil skimming device located at the influent to NHP should have diverted any floating diesel fuel on the water surface of EFPC into an adjacent oil collection basin.

The NPDES permit requires that a grab sample be obtained from the NHP effluent each week for an oil and grease content analysis. The laboratory data from the samples obtained from September 2 to October 27, 1987, are presented in Table 1. The discharge limits in the permit for oil and grease content are daily average of 10 milligrams per liter (mg/l) and daily maximum of 15 mg/l. The highest concentration of oil and grease found in Table 1 is 3.0 mg/l which is well below the

TABLE 1
OIL AND GREASE CONCENTRATION
IN NEW HOPE POND EFFLUENT

Date	Oil and Grease (Milligrams/Liter)
9/2/87	<2.0
9/9/87	2.0
9/15/87	<2.0
9/22/87	3.0
9/29/87	<2.0
10/6/87	<2.0
10/14/87	2.0
10/21/87	<2.0
10/27/87	<2.0

discharge limits.

5.2 Soils

The 9754-1 diesel fuel tank site is located on soils and residuum developed on the middle portions of the Nolichucky Shale of the Conasauga Group (Reference 3). Based on drilling data from the Y-12 Salvage Yard site immediately to the east (Reference 4), depth to bedrock should vary from 10 to 20 ft. throughout the 9754-1 tank site.

Soil chemistry data from a series of 26 borings conducted within the Y-12 Salvage Yard site in 1985 are available, although only four of the borings are located close enough to the 9754-1 tank site to be of use.

5.3 Hydrogeology

5.3.1 Groundwater Flow

Hydrogeological studies in soils and weathered bedrock developed on the Conasauga Group both in Bear Creek Valley (References 5, 6 and 7) and in Melton Valley (References 5 and 8) indicate that joints and fractures can exhibit a strong control on groundwater flow direction. Throughout Bear Creek Valley, major joint directions are parallel to and perpendicular to geologic strike, which parallels the ridge crests to the north and south of the valley. It is anticipated, therefore, that groundwater flow velocity at the 9754-1 tank site would be greatest in directions parallel to and perpendicular to the ridge crests and that the net groundwater movement would be oblique to geological strike.

5.3.2 Groundwater Monitoring

There are no existing monitoring wells at the 9754-1 tank site. There are, however, eight monitoring wells associated with waste disposal or storage sites surrounding the 9754-1 tank site

at distances of 100 to 400 feet. Weekly water level measurements for at least one calendar year (CY) are available for the wells surrounding the site. At least four quarters of water quality data are also available for each of the eight wells.

The eight wells adjoining the 9754-1 tank site were installed in the period 1984-1986 as part of site investigation activities associated with the Y-12 Salvage Yard (wells GW-270, GW-271 and GW-273) and the S-3 Ponds (wells GW-105, GW-106, GW-107, GW-108, and GW-109). The locations of these wells are shown on Figure 2. Construction details for the wells are presented in Reference 4. Wells GW-105, GW-107, GW-270, and GW-273 are shallow, water table wells finished at the approximate top of bedrock. Wells GW-106, GW-108, and GW-271 are between 50 and 75 ft deep and are finished in weathered bedrock. Well GW-109 is 147 ft deep and is completed in unweathered bedrock. Wells GW-105 and GW-106, and wells GW-107, GW-108, and GW-109 are combined to form piezometer clusters to investigate the vertical component of groundwater flow.

5.3.3 Water Levels, Hydrographs, and Water Table Map

The hydrographs for the water table wells (Figure 3) indicate that there is a northwestward to southeastward decrease in hydraulic heads across the 9754-1 tank site. Well GW-105, the northwesternmost well, has the highest hydraulic head and well GW-107, the southeasternmost well, has the lowest hydraulic head. Wells GW-270 and GW-273 have hydraulic heads intermediate to those in wells GW-105 and GW-107.

Hydrographs for the piezometer cluster northwest and northeast of the 9754-1 tank site suggest an upward gradient (Figures 4 and 5). In both cases the hydraulic head of the deeper well in the piezometer cluster is typically 1 to 2 ft higher than those of the shallow well. The response characteristics and trends of the hydrographs for the shallow and deep wells in both the piezometer cluster to the northwest and to the northeast are

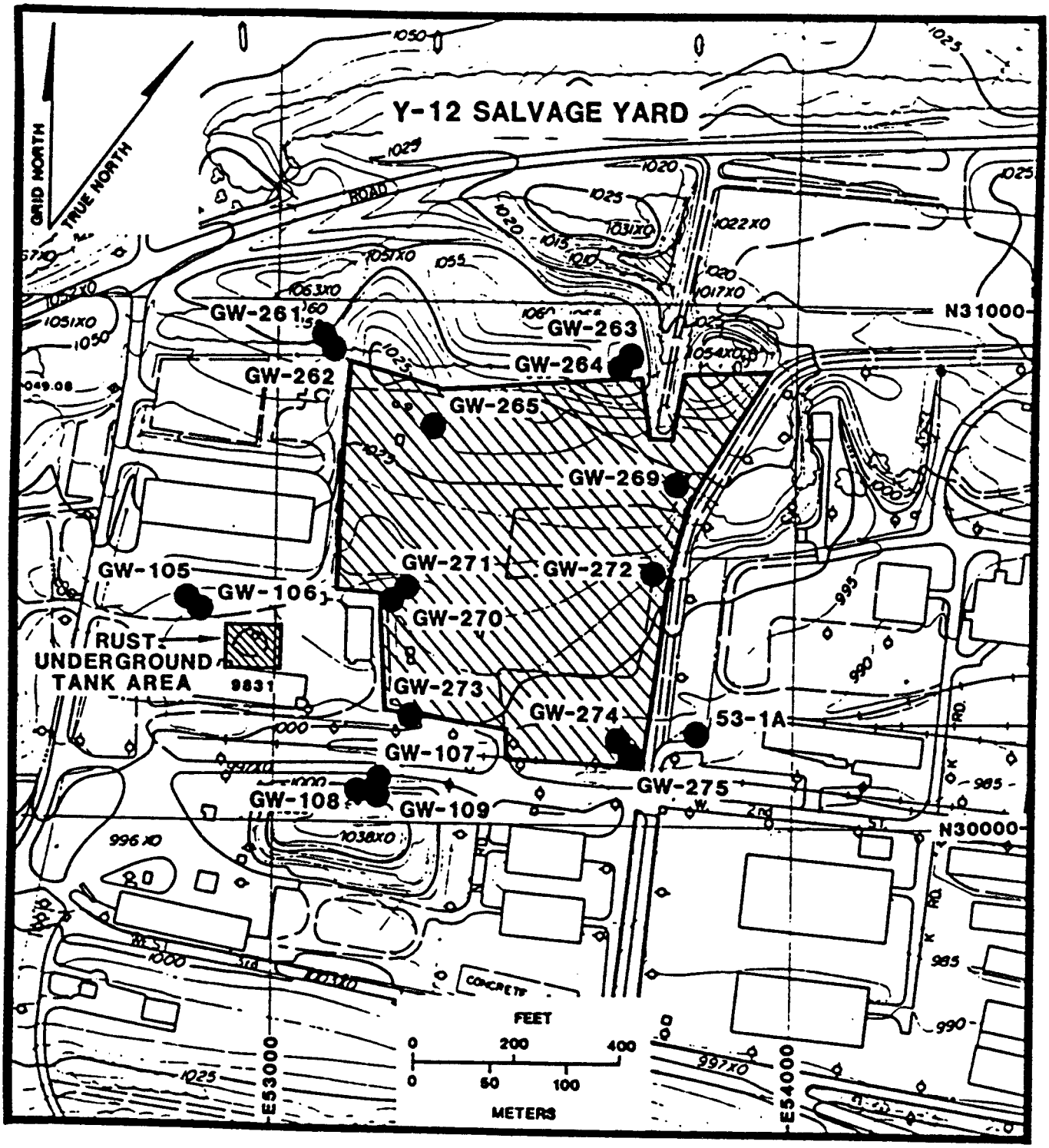


FIGURE 2

LOCATIONS OF EXISTING GROUNDWATER WELLS

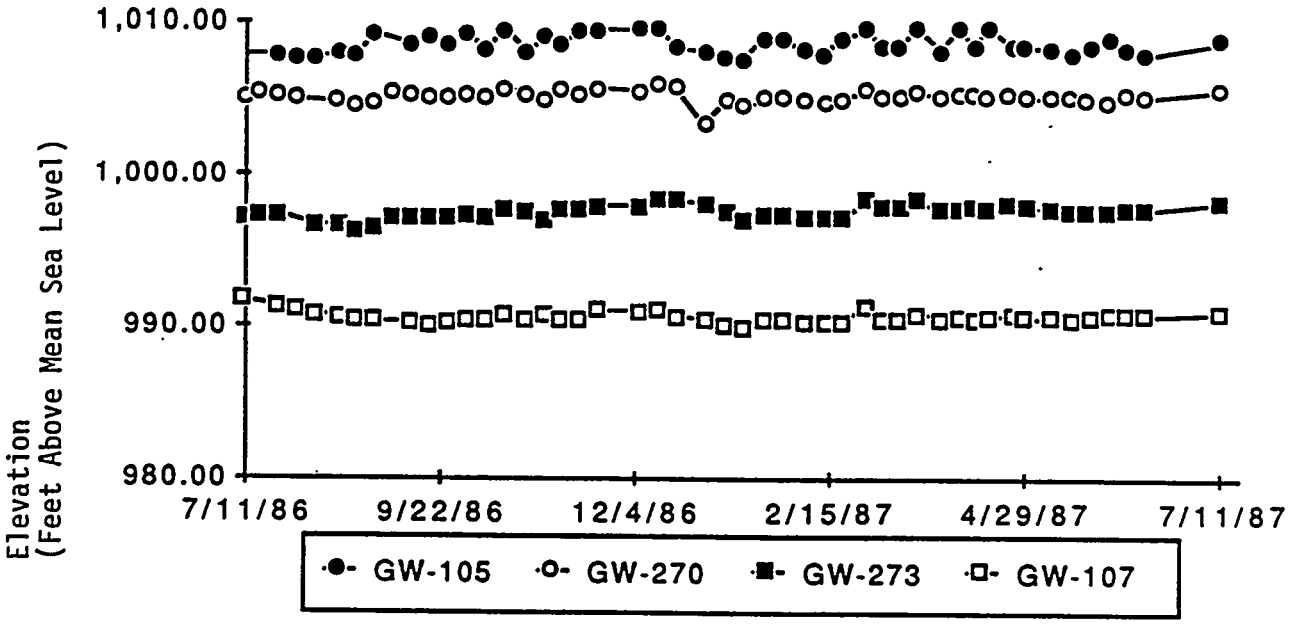


FIGURE 3

HYDROGRAPHS OF WELLS GW-105, GW-270, GW-273, and GW-107.

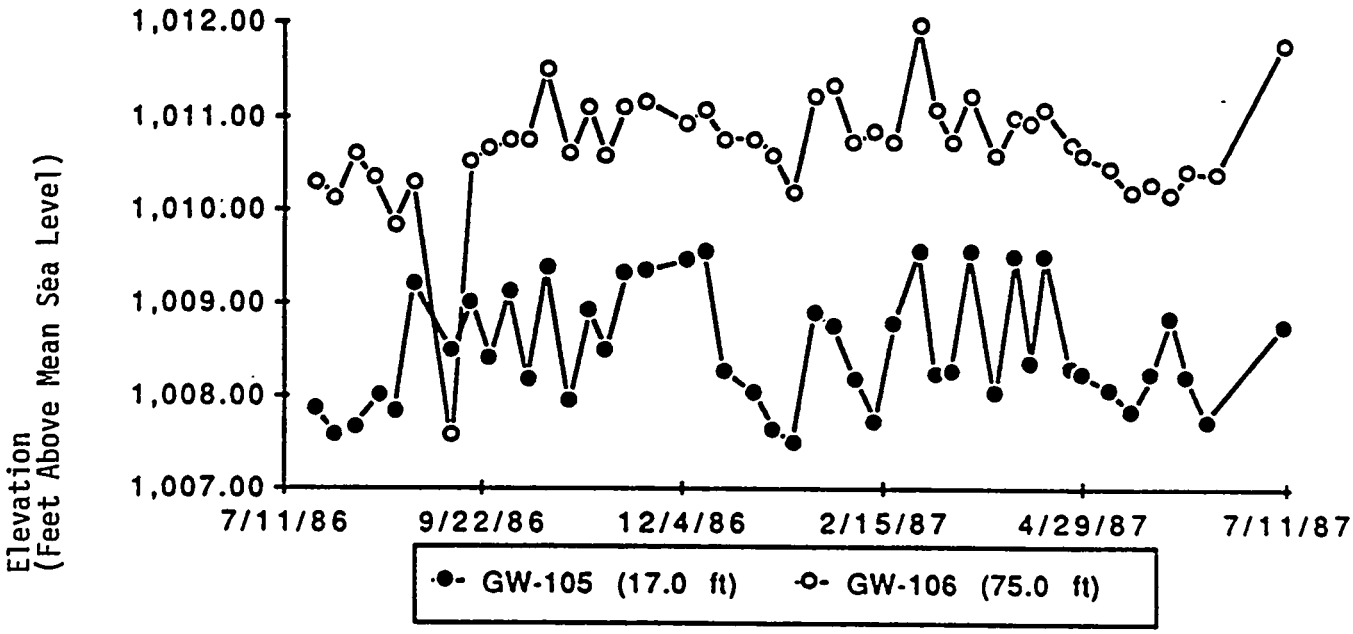


FIGURE 4

HYDROGRAPHS OF WELLS GW-105 AND GW-106

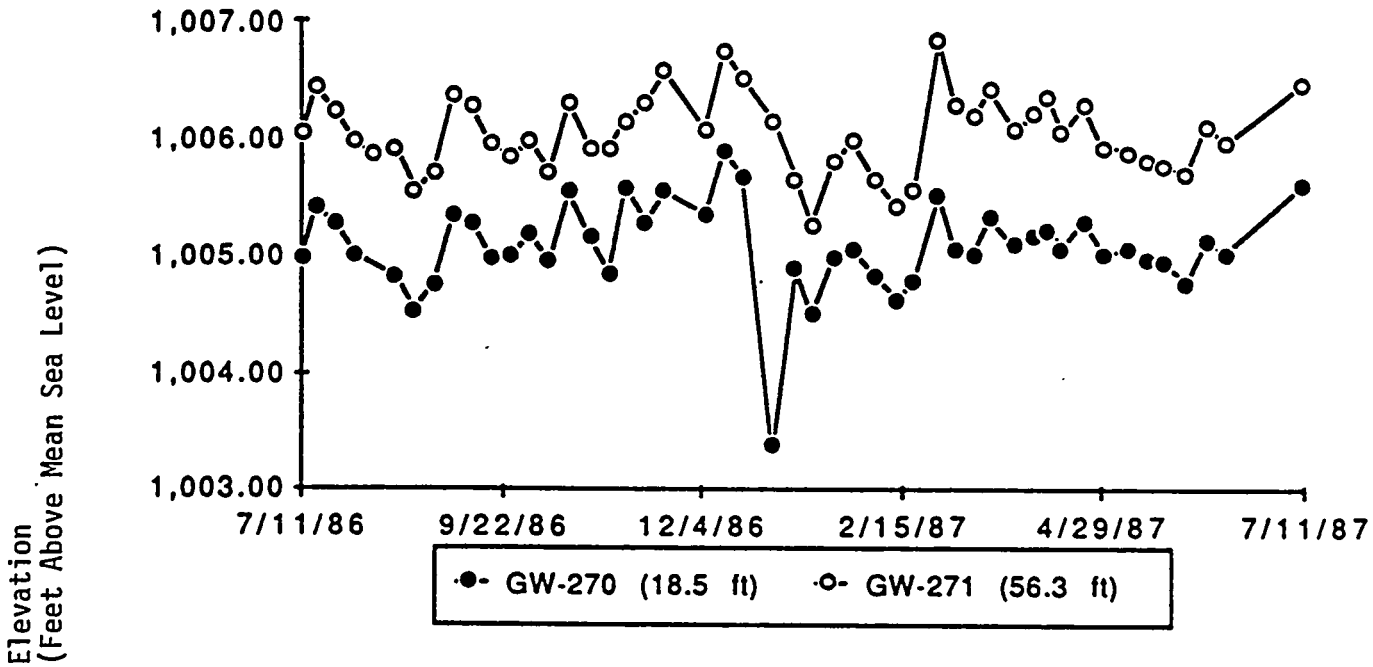


FIGURE 5

HYDROGRAPHS OF WELLS GW-270 AND GW-271

similar throughout the period of observation.

The vertical hydraulic head distributions illustrated for the piezometer cluster to the southeast of the 9754-1 tank site (Figure 6) suggest complex vertical flow conditions at this locality. There is a downward hydraulic gradient between the shallow and intermediate-depth wells and an upward hydraulic gradient between the intermediate-depth and deep wells.

A water table elevation contour map for the S-3 Ponds and surrounding areas on November 19, 1986, is presented in Figure 7 (Reference 9). A generally southeastward hydraulic gradient across much of the western end of the Y-12 Plant is apparent from the water table elevation contours (Figure 7). The contour patterns suggest that groundwater flow across the 9754-1 tank site would be predominantly to the southeast. A complete discussion of the hydrogeological conditions at the S-3 Pond site is provided by Geraghty and Miller (References 9 and 10) and at the Y-12 Salvage Yard site by Haase and King (Reference 4).

5.3.4 Water Chemistry

A complete listing of chemical data for quarterly samples taken during CY 1986 from wells at the Y-12 Salvage Yard site and a discussion of groundwater chemistry trends for that site are presented by Haase, Gillis and King (Reference 11). Similarly, groundwater trends for the S-3 Pond area are summarized by Geraghty and Miller (References 9 and 10).

Available groundwater data from the eight wells adjoining the 9754-1 tank site indicate that significant concentrations (several tens to several thousands of mg/l) of nitrates occur in shallow groundwater sampled by these wells (see Figure 8). Several of the metals for which primary drinking water standards have been established, specifically arsenic, barium, cadmium, lead, and mercury, may occur in concentrations exceeding the primary

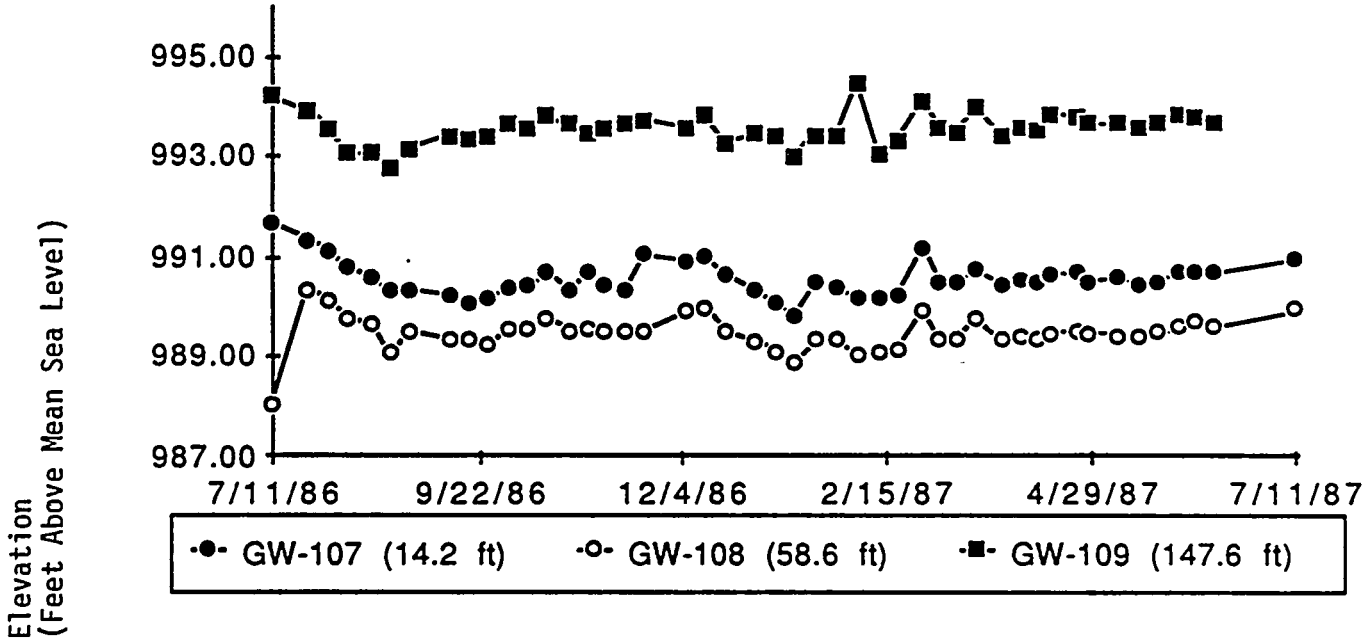


FIGURE 6

HYDROGRAPHS OF WELLS
GW-107, GW-108 AND GW-109

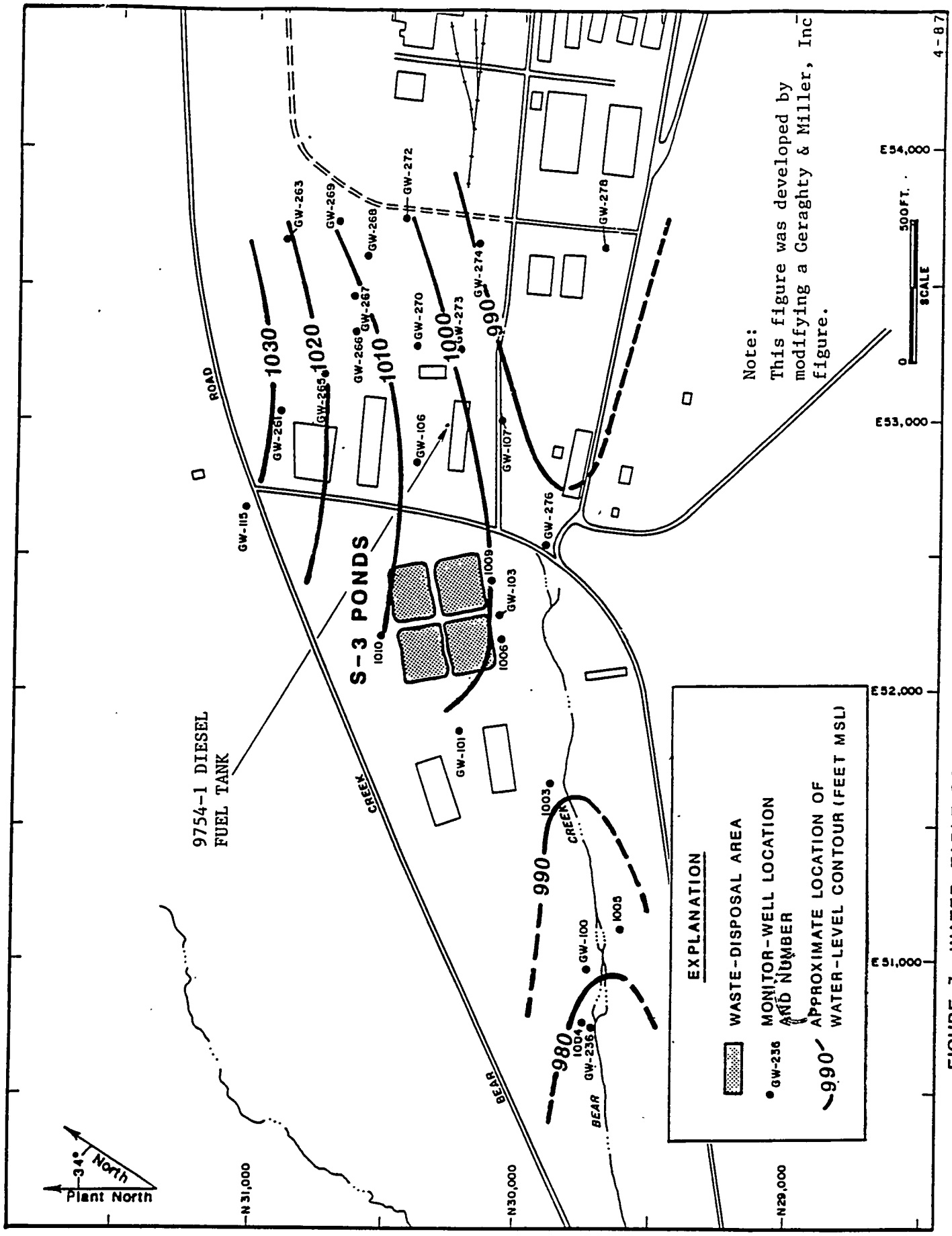
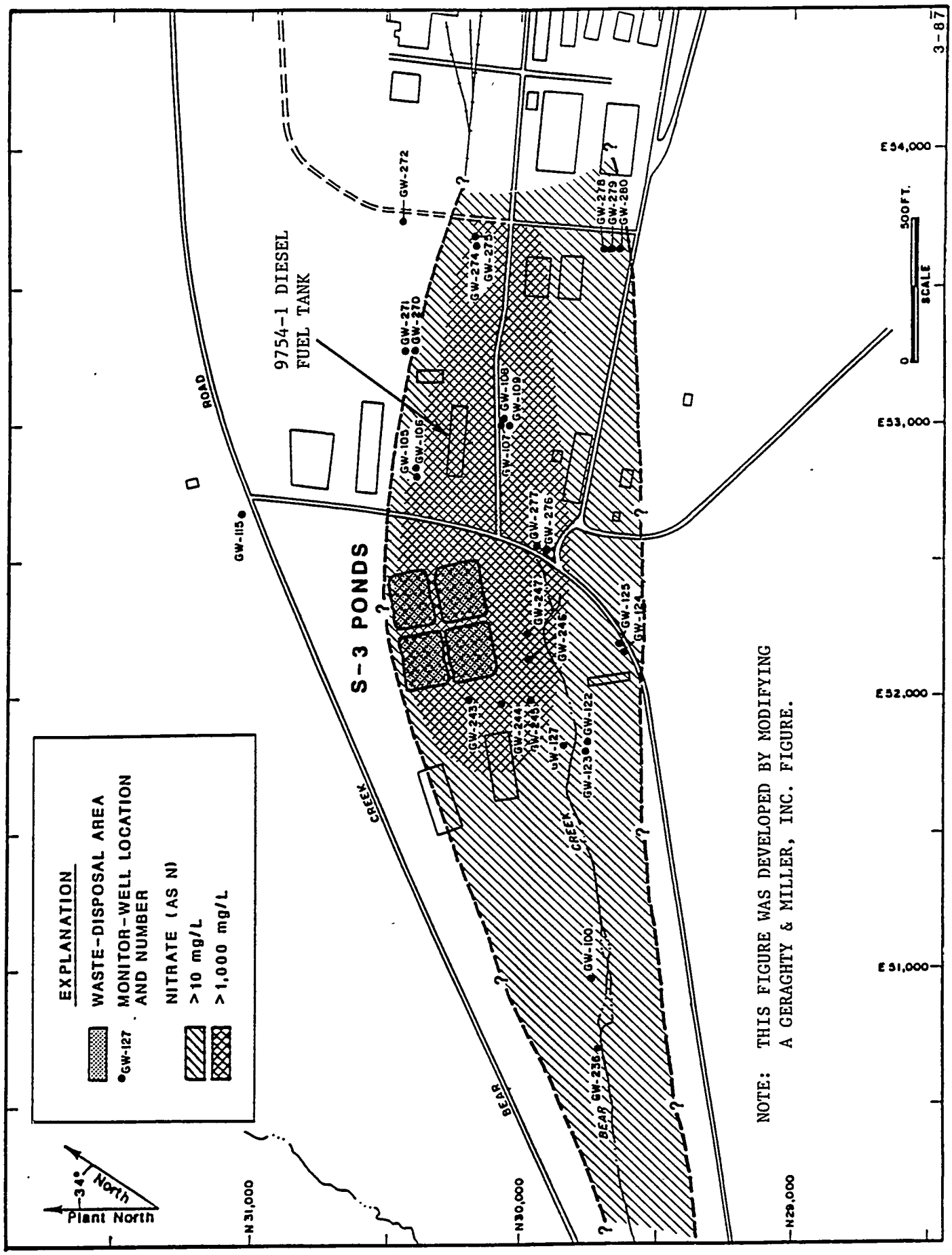


FIGURE 7 WATER-TABLE CONTOUR MAP AT THE S-3 PONDS, NOVEMBER 19, 1986



NOTE: THIS FIGURE WAS DEVELOPED BY MODIFYING A GERAGHTY & MILLER, INC. FIGURE.

FIGURE 8 OCCURRENCE OF NITRATE IN GROUND WATER AT THE S-3 PONDS

drinking water standards (Figure 9). The distribution and occurrence of these metals within the eight wells are complex, however, and no consistent pattern has been determined (References 9 and 11). Volatile organic compounds (VOCs) in the concentration range of several tens to several hundreds of ug/L are noted in the eight wells (Figure 10). Acetone, methylene chloride, tetrachloroethene, and chloroform are the most commonly detected VOCs. A review of available data indicates that the elevated nitrate, heavy metal, and VOC concentrations in the groundwater in the vicinity of the 9754-1 tank site are associated with the S-3 Pond (Reference 9).

It should be noted that an Alternate Concentration Limit study is being prepared for the contaminant plumes from the S-3 Pond for submission to TDHE.

6.0 SITE CHARACTERIZATION PLANS TO DETERMINE EXTENT OF CONTAMINATION

6.1 Surface Water

The tank site is covered by a concrete pad which in turn is surrounded by asphalt. Surface water contamination as a result of direct precipitation is not likely. However, the presence of the french drain along the tank site's southern perimeter provides a means for subsurface water to directly enter the storm sewer catch basin west of the tank site.

From an examination of the available water level data it appears that the gravel envelope surrounding the tanks at this site is within the water table. Diesel fuel should flow with the groundwater downgradient to the south to be intercepted by the french drain. The discharge from this french drain should be an indicator of a diesel leak and its subsequent movement off-site.

A visual inspection of french drain discharge will be performed on a weekly basis for four weeks. Samples will be taken during each

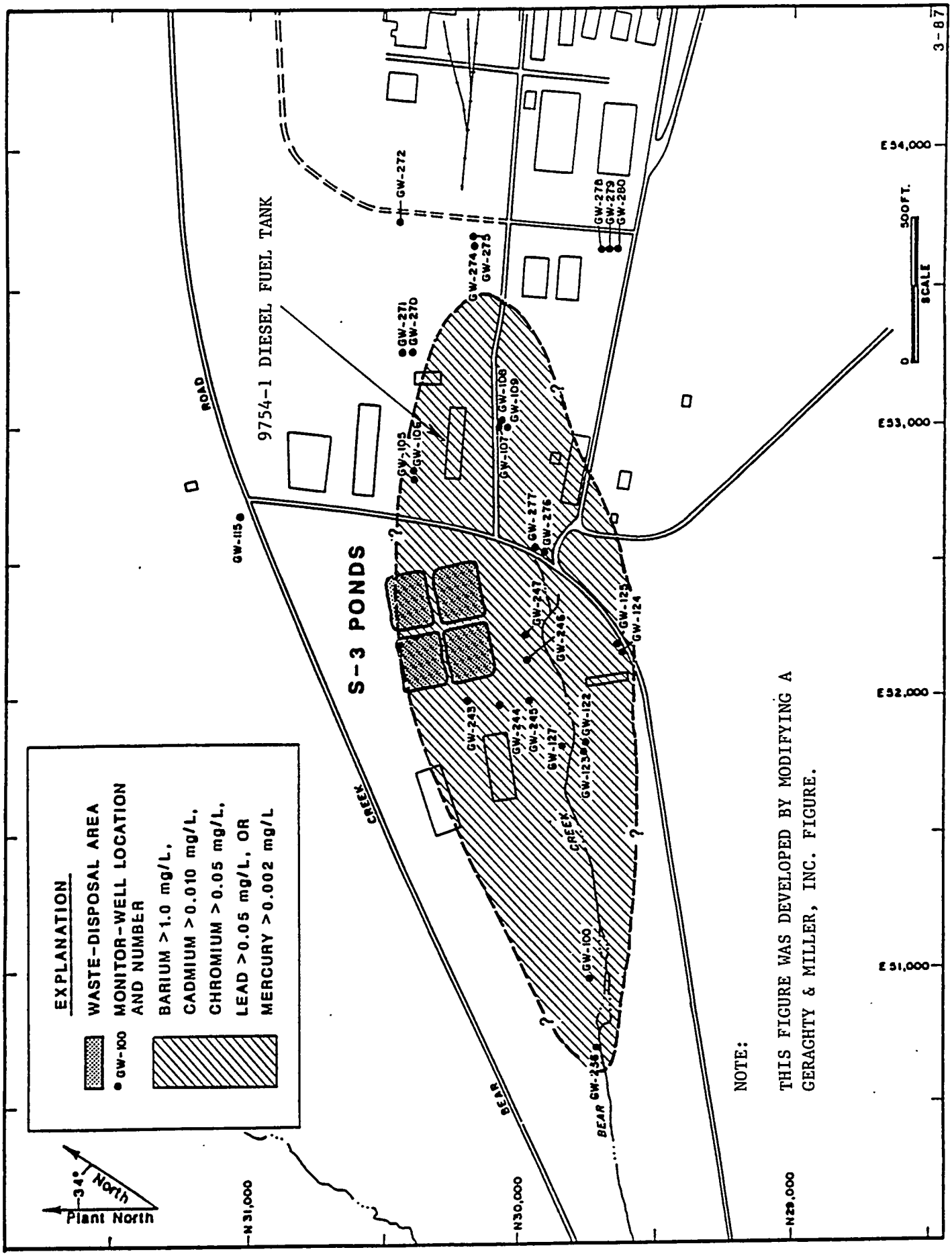
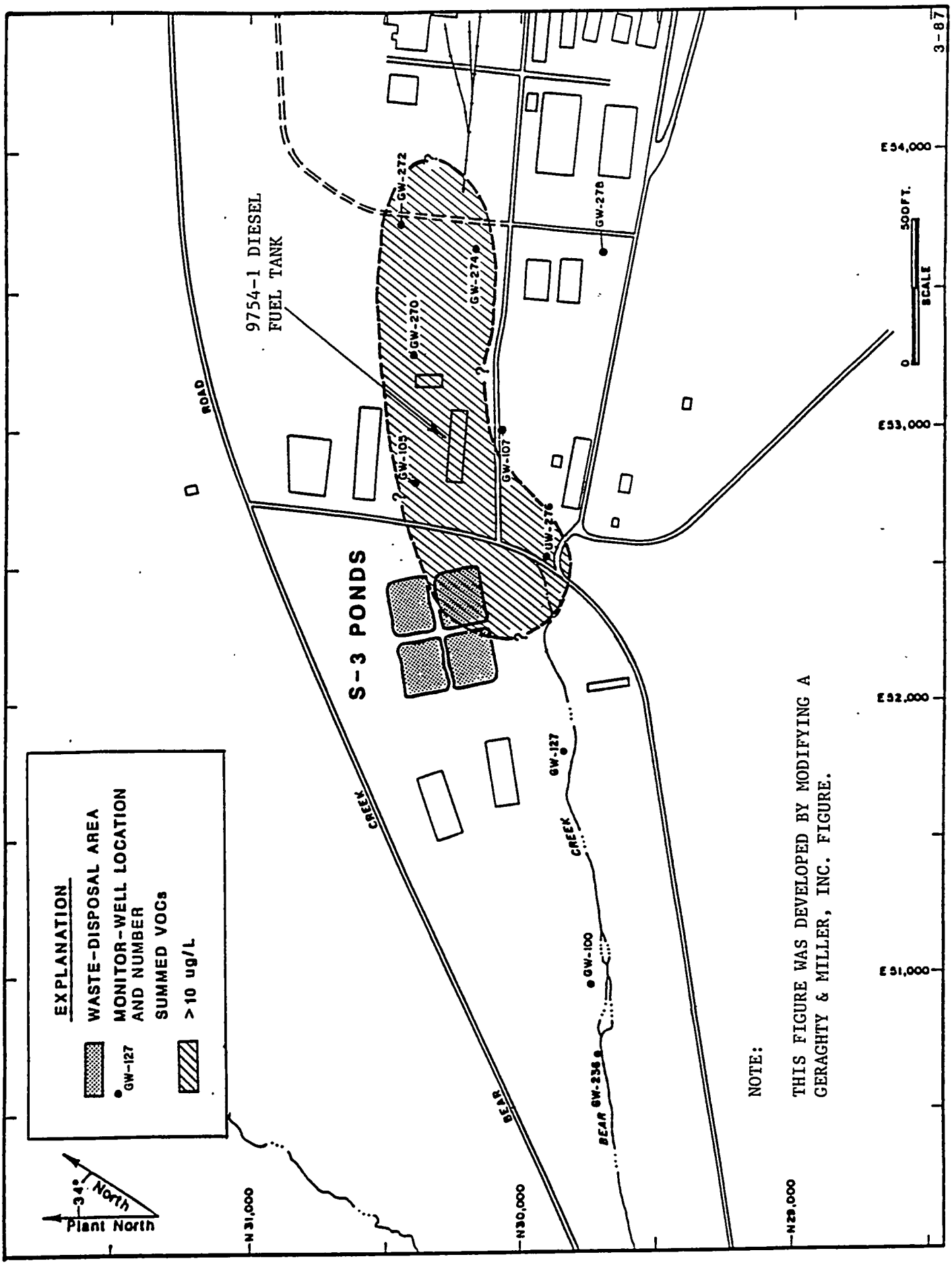


FIGURE 9 OCCURRENCE OF EPA PRIMARY DRINKING-WATER METALS IN GROUND WATER AT THE S-3 PONDS



NOTE:

THIS FIGURE WAS DEVELOPED BY MODIFYING A GERAGHTY & MILLER, INC. FIGURE.

FIGURE 10 OCCURRENCE OF VOCs IN GROUND WATER IN THE UNCONSOLIDATED ZONE AT THE S-3 PONDS

inspection if sufficient liquid is available for sampling. In addition, inspections will be conducted after one rainfall event. If sufficient free flowing liquid is available, samples will be obtained and analyzed for diesel fuel, benzene, toluene, and xylene in accordance with the EPA methods presented in Table 2.

6.2 Soil Sampling

Two types of soil sampling will be performed. One type of sampling will consist of a series of boreholes around the underground tanks to determine if diesel fuel has migrated out of the gravel backfill surrounding the tanks into the adjacent soil. The second type of sampling will be performed by removing a portion of the concrete pad above the diesel fuel tank in an attempt to locate the leak and to permit sampling of the gravel/soil in the immediate vicinity of the leak.

6.2.1 Soil Borings

Seven soil borings will be drilled into the soil surrounding the gravel backfill encompassing the three storage tanks in order to determine (1) whether or not the diesel fuel permeated into the soil around the three underground storage tanks and, (2) the areal and vertical extent of diesel fuel contamination, if it exists. Six of the borings will be made at the locations of groundwater wells GW-352 through GW-357, which are shown on Figure 11. The seventh borehole will be located north of GW-357. The soil borings at the individual well locations will be made prior to the well drilling and installation.

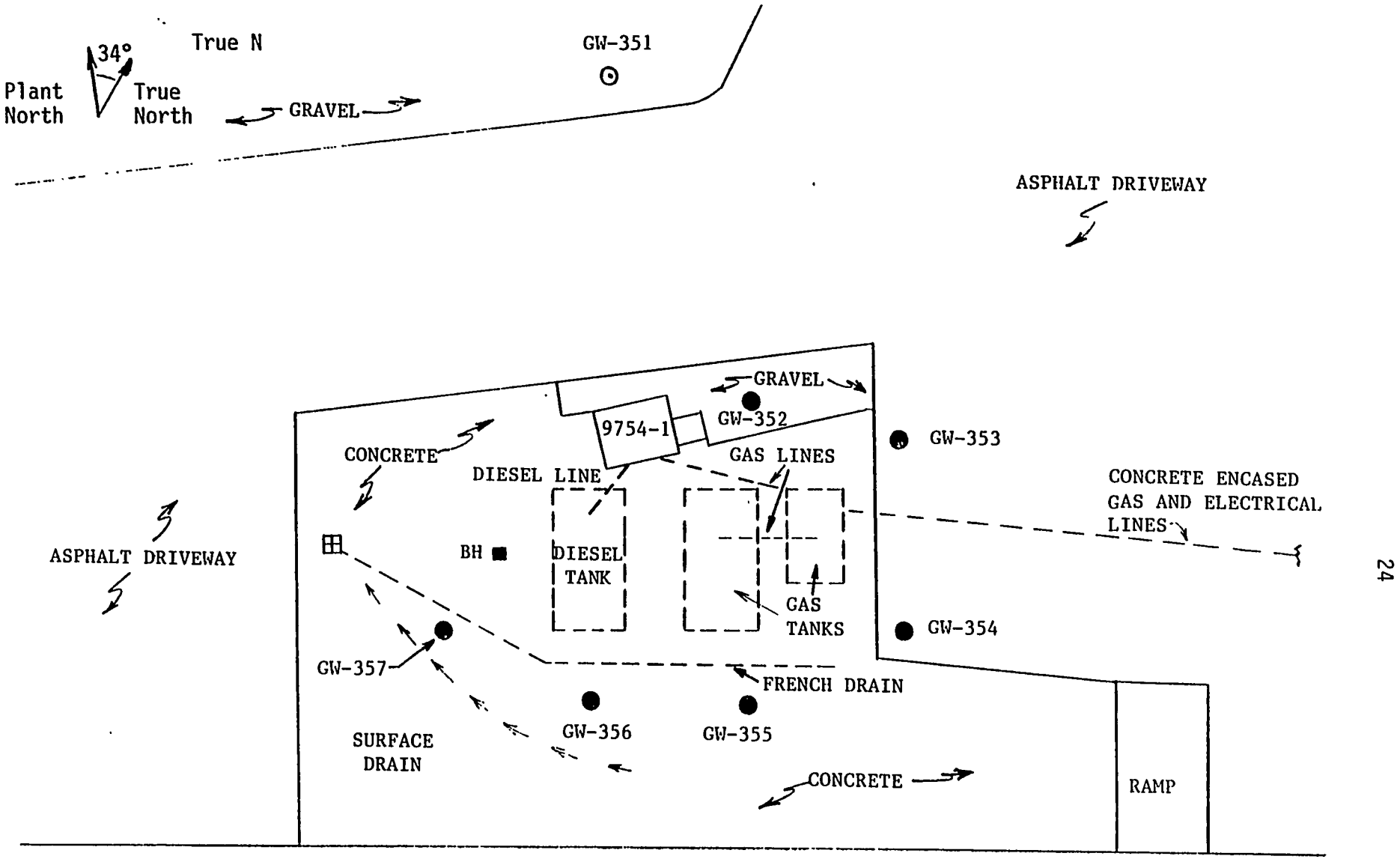
Soil samples from the boreholes will be obtained using a mobile drill rig equipped with thin-walled sampling tubes (Shelby tubes) or split-barrel soil samplers, whichever device yields

TABLE 2

LABORATORY ANALYTICAL METHODS

Materials	Media	Laboratory Analytical Method
Diesel Fuel	Water	EPA 418.1* - Total Petroleum Hydrocarbon
Diesel Fuel	Soil/Gravel	EPA 418.1* - Total Petroleum Hydrocarbon
Benzene, Toluene, Xylene	Water	EPA 624** - Purgeables by GC/MS
Benzene, Toluene, Xylene	Soil/Gravel	EPA 8240*** - GC/MS for Volatile Organics

*Reference 12
**Reference 13
***Reference 14



LEGEND

GW-352 ● : Groundwater Well with Borehole Samples
GW-351 ⊙ : Groundwater Well, no Borehole Samples
BH ■ : Borehole, no Groundwater Well

FIGURE 11

LOCATIONS OF BOREHOLES AND GROUNDWATER WELLS
Scale: 1" = 20'

better sample recovery. With minor modifications*, ASTM Methods D1587-74 and D1586-67 will be followed. Soil cores obtained by Shelby tube or split-barrel will be extruded either immediately in the field, or sealed with aluminum foil or teflon film and returned to the laboratory in a cooler for extrusion. The core section will be homogenized in a stainless steel pan by crushing and blending, and subsamples will be apportioned to appropriate sample containers for analysis. If the texture of the soil permits, channel-type samples may be obtained from the bottom to the top of the soil cores for each sample interval. If available, extra sample material will be retained to allow for archiving in the event additional analyses are required. Chain of custody procedures will be maintained throughout sampling, handling, and storage. Drilling equipment will be steam-cleaned between each borehole; sampling equipment will be thoroughly washed and rinsed between samples. Lithographic logs will be obtained during the drilling of the boreholes.

Boring and sampling at each borehole will proceed until auger refusal is reached. Sample intervals will be 24 inches (or total length of sample recovered if less than 24 inches in a 24-inch drive). The existing asphalt and concrete roadway surfaces will be removed before sampling begins and they will not be sampled. Any boreholes not converted to groundwater wells will be backfilled after sampling is completed using cement, bentonite, or a cement-bentonite mix.

---

*Maximum individual sample length may be 24 inches instead of the 18 inches specified in D1586. In addition, a 2 1/4 - 2 1/2 inch inside diameter split spoon with a 300 pound hammer may be used instead of a 1 3/8 inch inside diameter split spoon with a 140 pound hammer to ensure that a sufficient sample material is obtained for conducting the required laboratory analyses.

For each borehole, laboratory analysis will be conducted for diesel fuel and total benzene, toluene, and xylene for the borehole samples at the depth intervals of 0-2, 2-4, 4-6, 6-8, 8-10, 10-12, and 12-14 feet. A review of Drawing C2E-141584 and Figure 7 indicates that the water table is approximately 6 feet below ground surface at the 9754-1 tank site. Since diesel fuel has a specific gravity less than 1.0 and is immiscible with water, soil samples from the depths of 14 feet below the ground surface will not be analyzed unless high diesel fuel, and/or total benzene, toluene, and xylene concentrations are observed in the samples from 12 to 14 feet deep. Sample intervals that are not analyzed will be archived for later analysis if additional data are needed to delineate any contamination patterns more completely. Laboratory analyses will be conducted in accordance with the EPA methods presented in Table 2.

6.2.2 Excavation and Sampling Above the Tank

A portion of the concrete pad above the 9754-1 diesel fuel tank will be broken up and removed. The gravel/soil material underneath the pad will be carefully excavated to expose the top of the tank and the associated piping in an attempt to expose the leak source and to provide an opportunity to assess the condition of the exterior of the tank and piping system. At least five samples of the excavated gravel/soil will be obtained and analyzed for diesel fuel and total benzene, toluene, and xylene. Laboratory analyses will be conducted in accordance with the EPA methods presented in Table 2.

The samples will be collected with scoops or shovels, as appropriate, and placed in appropriate containers for laboratory analyses. Extra sample material will be retained to allow for archiving in the event additional analyses are needed. Chain of custody procedures will be maintained throughout sampling, transportation, analysis, and storage. Sampling equipment will be

thoroughly washed and rinsed or replaced between samples.

If any free product is observed in the excavation, it will be removed by the use of appropriate equipment such as pumps, wet vacuum systems, or oil absorbent materials. Any such material will be properly disposed of.

If the leak source is found and can be properly repaired, and the tank appears in satisfactory condition, the repair will be made and a Petro-Tite leak test or similar leak test will be conducted to verify the repair and remaining portion of the tank and piping system. The weekly testing of the tank as described in Section 3.2 will be terminated if the leak in the tank/piping is properly repaired. If the tank is in poor condition, it will be disconnected and removed from service to await appropriate remedial action as discussed in Section 7.0.

After the examination of the tank exterior and sampling of gravel/soil is complete, the excavated gravel/soil material will be used to backfill the excavation. The concrete pad will be repaired. The remedial action plan described in Section 7 will address any necessary excavation and disposal of gravel/soil containing excessive amounts of diesel fuel and/or total benzene, toluene and xylene.

Appropriate health, safety, and fire protection precautions will be observed in all work around the diesel and gasoline storage tanks.

6.3 Groundwater Investigations

6.3.1 Groundwater Monitoring Well Network

The objectives of well drilling activities at the 9754-1 tank site are (1) to install preliminary groundwater monitoring wells, (2) to characterize groundwater conditions at the site, and (3) to

determine the presence or absence of groundwater contamination as a result of the diesel fuel release. If contamination is detected at the site, geohydrological data obtained during this investigation will be used to define the extent of the contamination and to design and install a permanent monitoring well network.

To facilitate immediate assessment of the potential contamination surrounding the 9754-1 tank site, installation of groundwater investigation and monitoring wells will be conducted in two phases. Phase I will consist of the installation of wells GW-351 through GW-357. These wells are designed to specifically investigate shallow groundwater conditions and the extent of contamination at the 9754-1 tank site. Phase 2 will consist of installation of additional groundwater monitoring wells, as determined by the results obtained from sampling and analysis of groundwaters from the Phase I wells. Phase 2 will be canceled if groundwater contamination as a result of the diesel fuel release is not found in Phase I.

Approximate locations of Phase I groundwater monitoring wells proposed for the 9754-1 tank site are illustrated in Figure 11. A total of 7 wells are proposed. Well GW-351 is an upgradient well and is located at the edge of the high traffic area surrounding the underground tanks at the 9754-1 tank site. Well GW-352 is also an upgradient well, but it is located immediately adjacent to the underground tank facility. At this location, well GW-352 may be influenced by past surface spills of diesel fuel from an adjacent fuel pumping station and may not provide a accurate sampling of groundwater conditions unaffected by previous diesel fuel releases. Thus, comparison of results obtained from wells GW-351 and GW-352 should allow the affect of unrelated surface spills in the vicinity of the underground tank area to be evaluated. It should be noted that soil sampling at well locations GW-352 through GW-357 will be conducted as previously described before well drilling and construction.

Wells GW-355 through GW-357 will be installed immediately south of and adjacent to a french drain that runs along the south edge of the tank area, and will monitor for potential migration of free product and associated contaminants across the french drain in a down-dip direction. Wells GW-353 and GW-354 are designed to monitor potential free product and associated contaminant movement along strike. All wells installed at the 9754-1 tank site during Phase I will be shallow, screened, auger-drilled boreholes that extend into the top of the water table in the unconsolidated material at the top of weathered bedrock. Well screens will be installed to intersect the top of the water table so that any free product floating on the water surface can be directly sampled and evaluated.

6.3.2 Groundwater Monitoring Well Construction

Groundwater investigation and monitoring wells finished in unconsolidated material or in the uppermost portions of bedrock will be installed using sand filter packs and spiral-wound screens. All Phase I wells will be constructed with stainless steel or PVC well screen and casing material. Schematic diagrams of a typical groundwater investigation or monitoring wells are illustrated in Figures 12 and 13.

Phase I wells will be installed with an auger drill rig. Boreholes for the wells will be drilled with a 8-inch-diameter hollow-stem auger to total depth, typically at the point of auger refusal. Surface conductors will not be installed in auger-drilled wells. Spiral-wound, PVC or stainless steel well screens that are 4 inch ID with 0.010-in-wide slots will be installed to intersect the groundwater table. Appropriate length screens will be used. Flush joint, 4.5 inch OD stainless steel or schedule 40 PVC casing will be installed. The filter pack will consist of sand tremied into the annulus around the screen. Sufficient sand will be placed in the borehole to bring the level of the sand approximately 1 foot above the top of the screen. Clean silica

Figure 12

Screened Groundwater Investigation Well

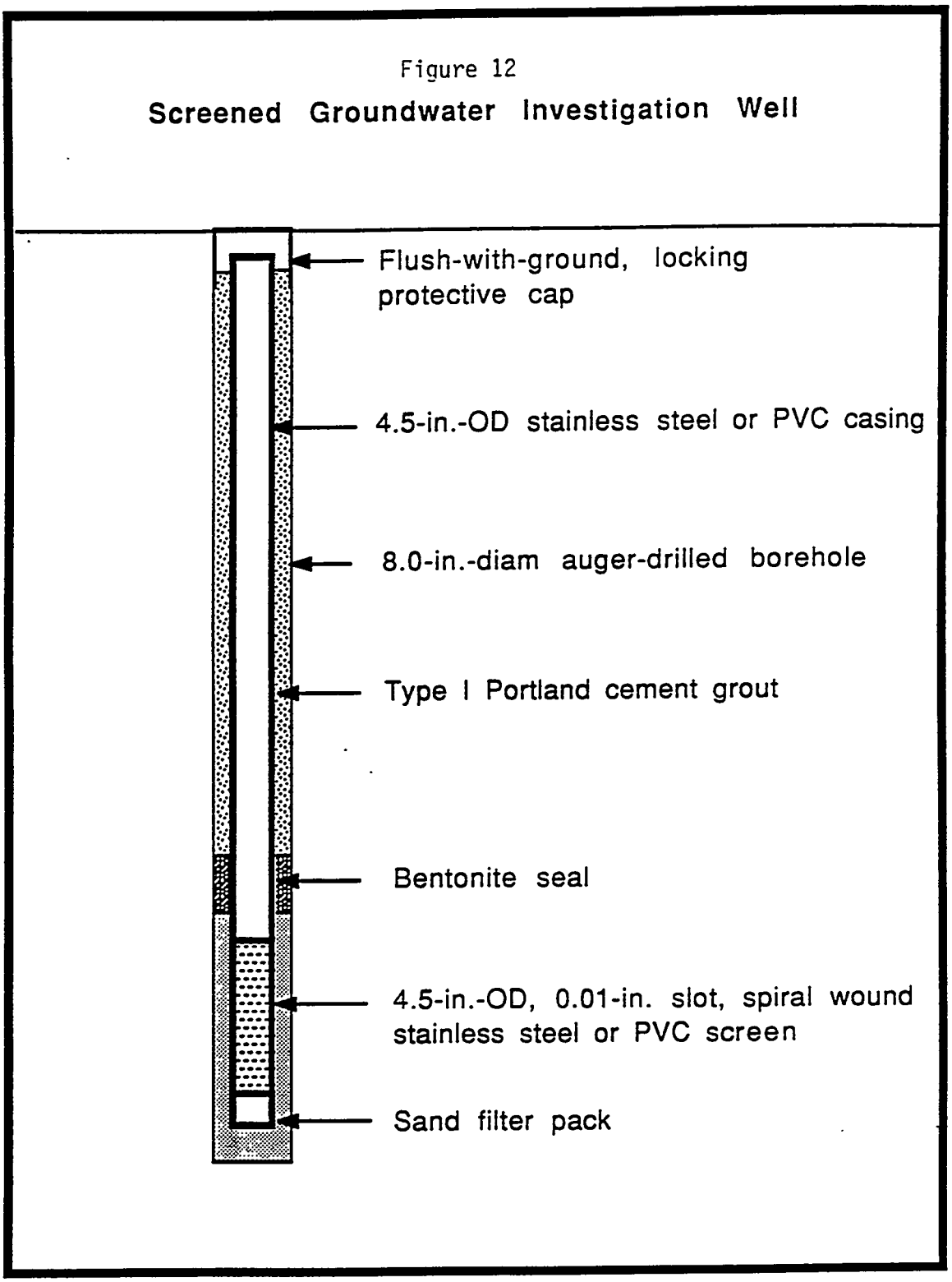
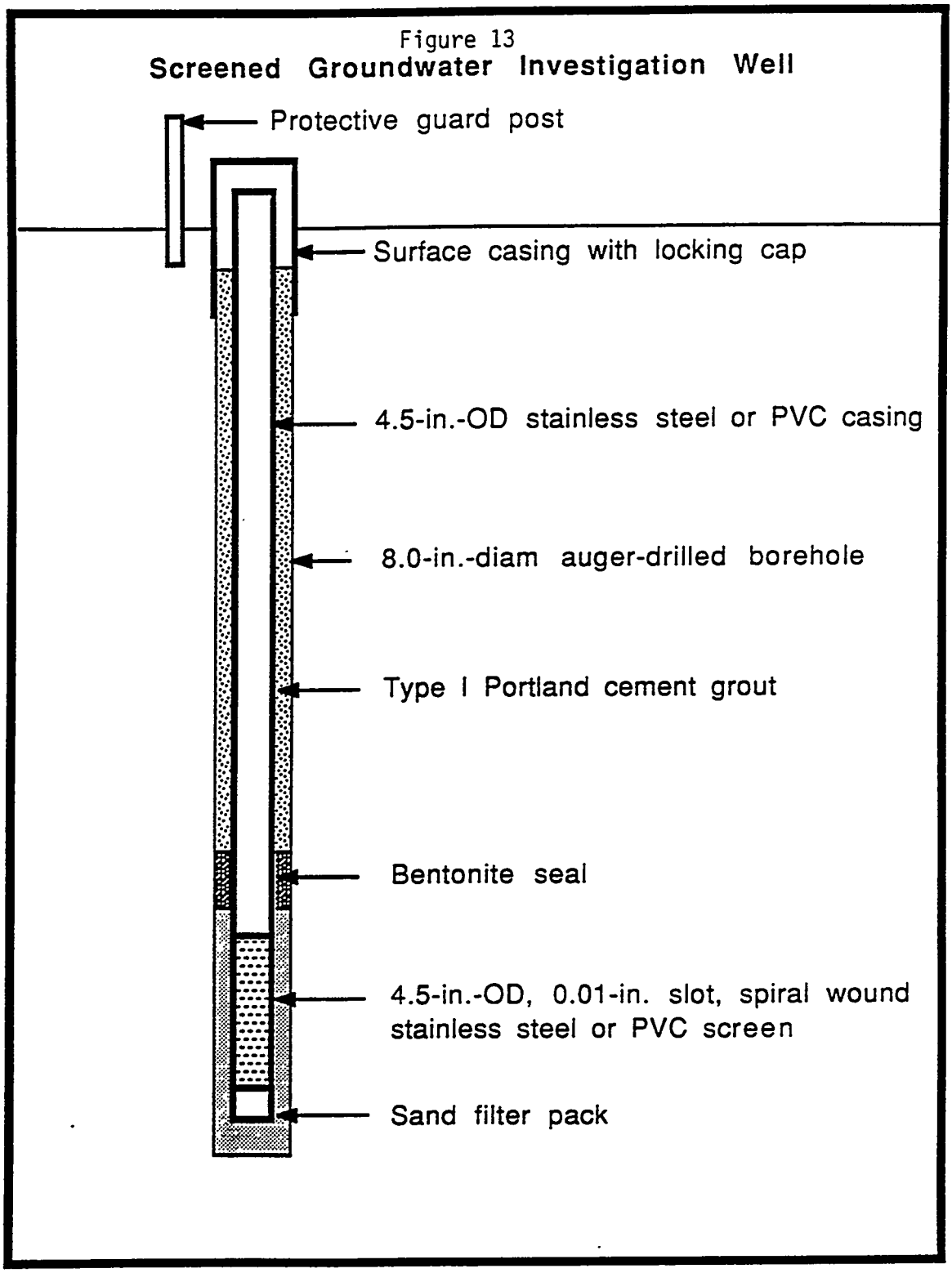


Figure 13
Screened Groundwater Investigation Well



sand passing through a #40 mesh sieve with 90-100% retained on a #60 mesh sieve and not more than 10% retained on a #80 mesh sieve will be used. A layer of 0.25-in-diameter bentonite pellets, 2 to 3 ft thick will be tremied on top of the sand filter pack into the annulus around the casing to form an upper seal for the filter pack. The remaining annulus space, above the filter pack seal, will be filled with a Portland Type 1 cement slurry, mixed at the ratio of 5.5 to 6.0 gal/100-lb sack. The cement slurry will be tremied into the annulus. During installation of the sand filter pack, the bentonite seal, and the grout, the casing will be suspended from the drill rig to allow it to be centered in the borehole. At least two centralizers will be used; one will be placed immediately above the top of the well and another will be placed approximately 2 ft below ground surface.

Phase I wells installed at the 9754-1 tank site will be developed by removing at least seven well volumes of water from the completed well. In high yield wells (>2 gpm of water), development pumping will be conducted more or less continuously until the required volume of water has been removed and a consistent level of water clarity has been achieved. During early stages of development, pumping action will be oscillated or momentarily stopped so as to surge the well to facilitate removal of drilling fines from the well bore.

In low yield wells (<2 gpm), that typically will not produce seven well volumes of water within six to eight hours of development time, the well will be pumped to dryness and allowed to recover for 24 hours, at which time the process will be repeated. Depending on the recovery behavior of the well, this procedure will be repeated from two to five times over a one week period. Development will be conducted with stainless steel or teflon bailers or with electric submersible pumps lowered to the bottom of the well on 1.00-in-OD steel pipe.

6.3.3 Groundwater Sampling

Water Levels. Subsequent to well development, water levels will be measured within all proposed wells on a weekly basis. Such measurements will continue for at least one year to establish the general behavior characteristics of each well. Water level measurements within wells at the 9754-1 tank site will be coordinated with other wells throughout the S-3 Pond and Y-12 Salvage Yard vicinities to provide a series of hydrologic "snapshots" that will allow instantaneous hydrologic gradients to be determined.

Groundwater Sampling and Analysis. All Phase I wells will be sampled initially as soon as practical after all well construction and development activities at the site are completed and water levels in the wells have stabilized. Because the main contaminant of concern is diesel fuel, analysis of samples from the Phase I wells at the 9754-1 site will be performed for diesel fuel, benzene, toluene, and xylene as listed in Table 2. Initial samples from the Phase I wells may be analyzed for additional parameters consistent with the current Y-12 Plant groundwater monitoring program which is under annual audit by TDHE. All sampling and analytical procedures will be in accordance with those established by the U.S. Environmental Protection Agency (References 12, 13, and 14).

Approximately four weeks after the initial samples are collected, a confirmatory set of samples will be obtained from the wells and analyzed to verify the initial data. All Phase I wells will be sampled after at least one rainfall event that increases the elevation of the groundwater in the wells to determine the impact of rainfall on contaminant concentrations in the Phase I wells.

If the results from the initial and confirmatory samples and

the rainfall event samples do not exceed 0.1 mg/l diesel fuel, 0.005 mg/l benzene (Reference 15), 2.0 mg/l toluene, and/or 0.44 mg/l xylene (Reference 16), the groundwater will be considered not contaminated for the purpose of preparing the report addressed in Section 7. In this case, quarterly samples for the previously mentioned parameters will be obtained from the wells for at least one year after the initial sampling to provide for additional monitoring of the site. Samples will be obtained after at least one additional rainfall event. Phase 2 groundwater well program will not be performed.

If the data from the initial and confirmatory samples, and the rainfall event samples indicate that diesel fuel, benzene, toluene, and/or xylene contents exceed the previously presented criteria, the report addressed in Section 7 will evaluate the need for performing remedial action on the groundwater and, if necessary, will present a plan for Phase 2 well installation and monitoring to define the extent of any contaminant plume. If Phase 2 wells are necessary, a soil gas study may be conducted in an effort to delineate the boundary of the contaminant plume. Such information, in conjunction with available hydrogeologic data, would be used for siting any necessary Phase 2 wells.

7.0 REMEDIAL ACTION PLAN

After the completion of the sampling and analysis of the soil samples, surface water samples, and Phase I groundwater samples, a report will be written to describe the sampling activities that were performed and to present a summary of the resulting laboratory data. If contamination as a result of the diesel fuel release is found, and if sufficient information is available to design the necessary remedial action, the report will also include a plan to address any necessary remedial action of the 9754-1 diesel fuel tank, the gravel/soil around the tank, the soil around the gravel backfill around the tanks, the water discharging from the french drain, and the groundwater. If insufficient information is available for defining the extent of contamination in a particular media(s) (i.e., inadequate

definition of a groundwater plume), then the report will present additional sampling and analysis plans that will have to be performed so that the appropriate remedial action can be properly designed and implemented.

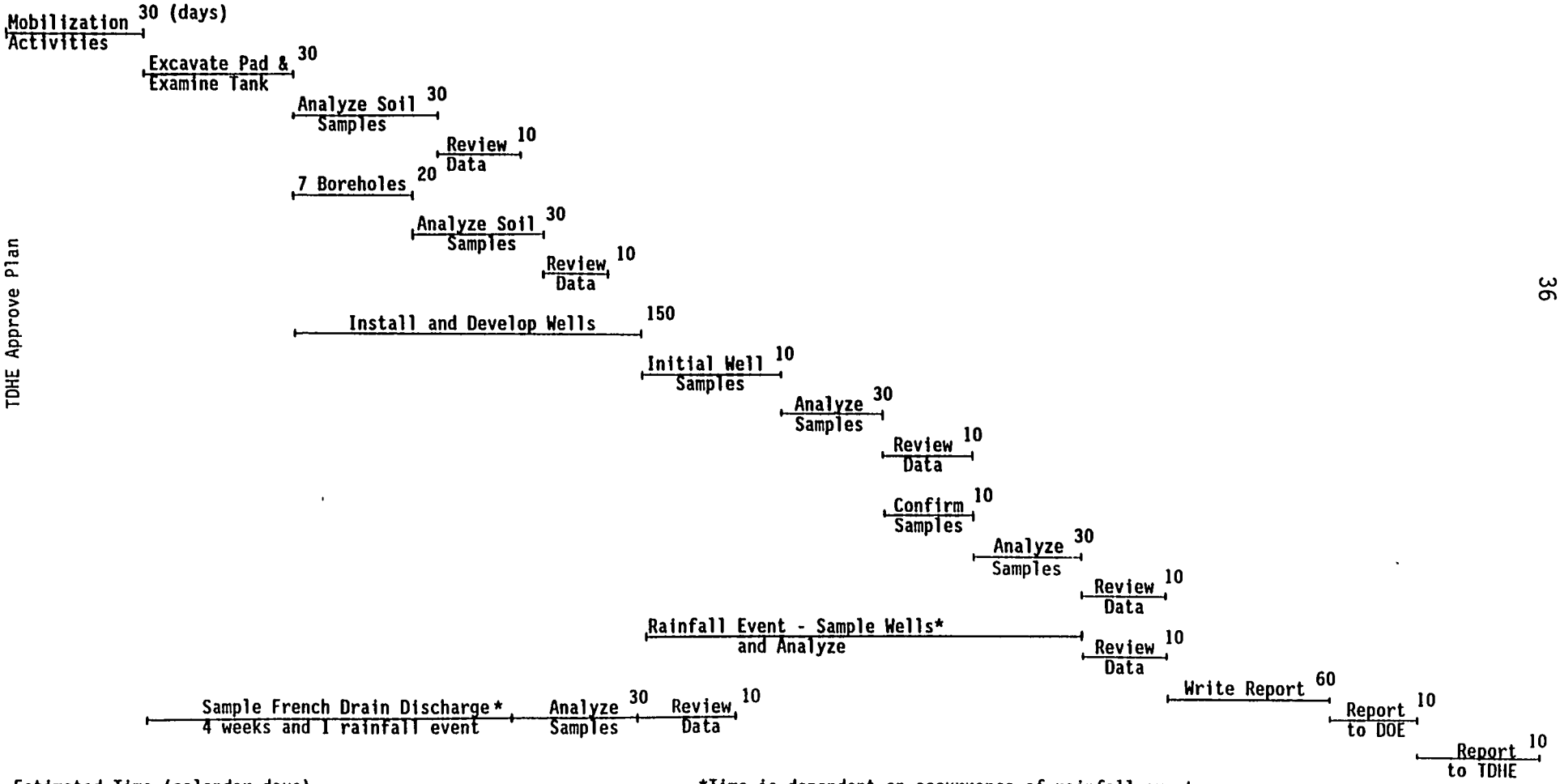
Guidance previously provided by TDHE for a leaking underground storage tank at the Oak Ridge Gaseous Diffusion Plant (Reference 15) will be used to determine whether or not remediation of the soil/gravel media will be necessary. The guidance indicated that remediation will be necessary if soil/gravel contains diesel fuel greater than 100 mg/kg and/or total benzene, toluene, and xylene greater than 10 mg/kg. Criteria for determining the necessity of remediation of groundwater at the site or water discharged from the french drain will be proposed in the remedial action plan. The proposed criteria may consider the Alternate Concentration Limit study being conducted for the contaminant plumes from the S-3 Pond site in conjunction with the criteria presented in Section 6.3.3.

If it is determined that remediation is needed at the site, the report will "include options for cleanup of the site and explain the decision making process in choosing a specific option" (Reference 1). The plan will include a detailed description of any selected remedial action and an estimated schedule for implementation and cleanup. The plan will be submitted to TDHE for review before implementation.

8.0 SCHEDULE

An estimated time line for conducting the activities presented in this assessment plan is shown in Figure 14. To allow time for mobilization, the activities will be started approximately thirty days after receiving approval of the plan. This estimated schedule is subject to unknown factors such as weather conditions, actual boundaries of contamination, availability of laboratory capacity, etc. If the schedule cannot be met, TDHE will be appropriately notified.

FIGURE 14.
ESTIMATED TIME LINE FOR ENVIRONMENTAL ASSESSMENT FOR 9754-1 DIESEL FUEL TANK RELEASE (not to scale)



Estimated Time (calendar days)

*Time is dependent on occurrence of rainfall event.

REFERENCES

1. Letter, Dan S. Hawkins to Mr. Robert J. Spence, dated October 30, 1987, "Diesel Fuel Leak at the Y-12 Facility, Anderson County, Tennessee."

2. Mechanical Inspection Department Test and Inspection Report, dated September 24, 1987, Diesel Tank (Underground), MID No. 1122-0302, Operation No. 1219U.

3. King, H. L., and C. S. Haase, "Subsurface-controlled geological maps for the Y-12 Plant and adjacent areas of Bear Creek Valley," ORNL/TM-10112, 1987.

4. Haase, C. S. and H. L. King, "Preliminary Hydrological and Hydrochemical Assessment of the Salvage Yard Site at the Oak Ridge Y-12 Plant," Y/TS-323 (in preparation), 1988.

5. Sledz, J. J., and D. D. Huff, "Computer Model for Determining Fracture Porosity and Permeability in the Conasauga Group, Oak Ridge National Laboratory, Tennessee," ORNL/TM-7695, 1981.

6. Rothschild, E. R., Turner, R. R., Stow, S. H., Bogle, M. A., Hyder, L. K., Sealand, O. M., and Wyrick, H. J., "Investigation of Subsurface Mercury at the Oak Ridge Y-12 Plant," ORNL/TS-9092, 1984.

7. Geraghty and Miller, Inc., "Aquifer Test Data and Design of Recovery Wells, S-3 Ponds," Y/SUB/86-00206C/2, 1986.

8. Rothschild, E. R., Huff, D. D., Haase, C. S., Clapp, R. B., Spalding, B. P., Farmer, C. D., Farrow, N. D., "Geohydrologic Characterization of Proposed Solid Waste Storage Area (SWSA) 7," ORNL/TM-9314, 1984.

9. Geraghty and Miller, Inc., "Proposed RCRA Groundwater Quality Assessment Plan for the S-3 Ponds Hazardous-Waste Disposal Unit at the Y-12 Plant," Y/SUB/87-00206C/4, 1987.

10. Geraghty & Miller, Inc., "Remedial Alternatives for the Bear Creek Valley Waste Disposal Area," Y/SUB/85-00206C/3, 1985.

11. Haase, C. S., Gills, G. A., King, H. L., "Subsurface Data Base for Bear Creek Valley, Chestnut Ridge, and a portion of Bethel Valley on the U.S. Department of Energy Oak Ridge Reservation," ORNL/TM-10000, 1987b.

12. "Methods for Chemical Analysis of Water and Wastes," EPA 600/4-79-020, 1983.

13. Code of Federal Regulations, 40CFR136, October 26, 1984.

14. "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA Publication SW-846, Third Edition, November 1986.

15. Letter, Dan Hawkins to William F. Manning, dated March 13, 1987, "Underground Storage Tank Leak at the K-1414 Garage at the ORGDP Facility."

16. "Table 12. - Proposed RMCL's and AADI's for SOC's Proposed for Regulation," Federal Register, Vol 50, No. 219, November 13, 1985.

17. "Recommended Practice for Abandonment or Removal of Used Underground Service Station Tanks," American Petroleum Institute Bulletin 1604, First Edition, March 1981.

18. "Underground Storage Tank Corrective Action Technologies," EPA/625/6-87-015, 1987.

DISTRIBUTION

U.S. DOE-ORO

H. M. Cox
J. M. Forstrom (8)
C. S. Gist
H. W. Hibbitts
R. C. Sleeman
R. J. Spence
T. S. Tison

HEALTH, SAFETY, ENVIRONMENT, AND ACCOUNTABILITY DIVISION

J. K. Bailey
D. E. Bohrman
H. L. Fellers, Jr.
G. A. Gillis
C. C. Hill
C. W. Kimbrough
L. L. McCauley
L. W. McMahon
M. J. Shelton
L. O. Vaughan
S. H. Welch
H. D. Whitehead, Jr.
M. L. Willoughby

ENVIRONMENTAL AND SAFETY ACTIVITIES

L. W. Long
T. P. A. Perry

ENGINEERING DIVISION

W. D. Barton
W. J. Nichol (4)

ENVIRONMENTAL SCIENCES DIVISION

C. S. Haase

QUALITY AND TECHNICAL SERVICES DIVISION

S. R. Rizk

PRODUCT CERTIFICATION DIVISION

K. D. Calfee

SAFEGUARDS AND SECURITY DIVISION

E. R. Edwards

J. M. Mills/DOE-TIC
Y-12 Central Files - RC